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Letter to Editor

# Mechanical versus electrical detachment of coils in treatment of intracranial aneurysms: Role in sickle cell disease

*Keywords:*
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*Sir,*

Sickle cell disease (SCD) is associated with clinically significant cerebrovascular complications in up to 30% of patients including increased risk of thromboembolism [1]. It may also result in intracranial aneurysm formation which are generally multiple and is thought to be due to recurrent red cell sickling [2]. Sickle cell trait (SCT), a carrier condition may also rarely manifest with features of SCD. Craniotomy and clipping may pose operative risk of surgery in SCD and SCT [3]. The literature is sparse regarding safety and efficacy of endovascular procedures in such patients. The electric detachment of coils in SCD may enhance the risk of thrombosis due to intraluminal current that may be compounded with intimal burn. We report a case of aneurysm managed in SCT by endovascular coiling and technical aspects of it using mechanical detachment system (MDS) with good radiological and functional outcome. This study was exempt from getting an ethical permission in our institution and the patient as well as the relatives agreed that this case will be an object of scientific observation and publication.

A 47-year old female, known case of SCT, presented to us with the chief complaints of sudden onset holocranial headache with recurrent episodes of vomiting for past 3 days. There was no history of any other co-morbidities. Neurological examination revealed no sensory and motor deficit with normal cranial nerve examination findings. Non-contrast computed tomography (NCCT) of brain revealed sub arachnoid haemorrhage in the basal cisterns. CT angiography of the brain was suggestive of single saccular multilobed left internal carotid artery supraclinoid aneurysm measuring 11X13X23 mm which was confirmed by a preoperative digital subtraction angiogram (DSA) (Fig. 1a). Contrast enhanced computed tomography (CECT) chest with CT angiography and CECT abdomen was obtained to rule out thrombosis which was negative. Ophthalmological evaluation and routine blood and urine investigations were within normal limits. Routine methods to detect haemolysis including bilirubin and lactate dehydrogenase (LDH) were negative. After informed consent, patient was taken up for endovascular coiling via transfemoral route using MDS. The postoperative DSA revealed a satisfactory angiographic occlusion (Fig. 1b). She had uneventful recovery in the postoperative period with neither a sickle crisis occurring nor exchange transfusion needed and was discharged in a satisfactory condition.

Neurological complications occur in 18–29% of patients with homozygous HbS sickle cell disease [4]. The literature has documented only few cases of SAH secondary to cerebrovascular aneurysms in patients with SCD and further very few cases in patients with SCT. Cerebral infarction results in over 75% of the neurological complications while intracerebral haemorrhage and SAH develops in 20% and 1–2% respectively [5].

Intracranial aneurysms are an infrequent complication of SCD and they are not associated with usual risk factors of aneurysm formation like hypertension, arteriosclerosis, cigarette smoking or connective tissue disease [2] but are proposed to be acquired from vascular damage secondary to hypoxia, red cell sickling, endothelial injury, vessel wall degeneration and vascular occlusion [1,2]. Stehbens attributed saccular aneurysms to hemodynamically induced degenerative changes in the arterial wall related to atherosclerosis resulting in the loss of tensile strength; these acquired changes are pre-aneurysmal in nature [6].

The management of SAH and cerebral aneurysm in patients with SCD is associated with the development of sickle cell crisis due to hypoxia, acidosis and hypothermia, and also with the use of radiological contrast media in these patients. Traditionally these are managed by open aneurysmal clipping because a concern in these patients is that coiling increases the risk of local sickling and arterial occlusion [3]. However, the endovascular technique has the advantages that access to inoperable aneurysms may be attainable, craniotomy is avoided, and the procedure sometimes can be performed

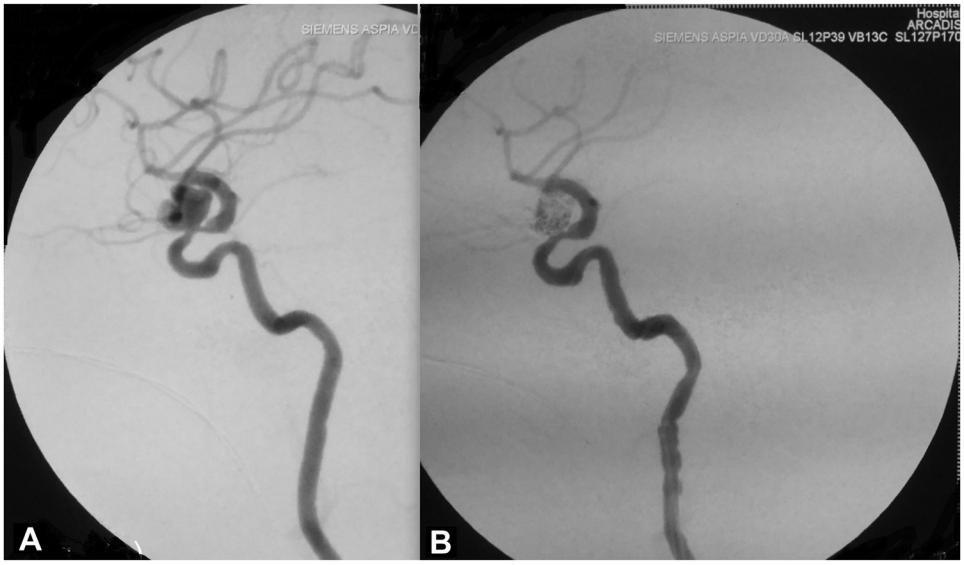


**Fig. 1 – (a) Lateral view DSA of left ICA depicting single saccular multilobed aneurysm arising from supraclinoid segment of left Internal carotid artery measuring 11X13X23 mm. (b) Postoperative angiogram revealing the coiled obliterated aneurysm with mild spasm in ICA.**

without general anaesthesia. While conventional craniotomy is associated with increased rates of morbidity (18%) and mortality (24%), this procedure has demonstrated morbidity and mortality rates of only 8.5% and 4% respectively [7]. With either treatment strategy, intraoperative management in SCD patients should include adequate oxygenation to prevent tissue hypoxia and to avoid hypothermia and venous stasis to reduce the occurrence of intravascular sickling. Packed red blood cell transfusion preoperatively to accomplish a goal HbS of 30% and the use of newer non-ionic contrast media have reduced the complication rate during diagnostic and therapeutic endovascular procedures.

Although coiling is usually safe and effective, various complications namely procedure-related rupture of the aneurysm, thromboembolic phenomenon related to the delivery system or coil, occlusion of the parent artery by protruded coils may occur [7]. However, the most common are ischaemic complications resulting from thrombosis of the artery and distal embolic phenomena from embolized aneurysms or related devices. Pelz et al. in their series of cerebral aneurysms, reported the incidence of strokes with endovascular treatment being 28% [8] while Rordorf and colleagues noticed a 61% incidence of silent thromboembolic episodes with such procedures [9]. Potential sources of thromboembolic events can be catheters, partially occluded aneurysmal sac or pre-existing thrombi within the aneurysmal sac and coil mass surface.

Literature is sparse regarding best modality of treatment of intracranial aneurysms in SCD patients. Medline search returned zero results regarding utility of MDS in SCT patients. Since SCT patients are already predisposed to thrombosis, MDS was a preferred modality over EDS in the current case as the latter is associated with higher incidence of thromboembolic complications which is further compounded by intimal burn. Embolization with MDS, on the other hand is rapid with little or no chances of thromboembolic complications and the process does not deliver heat at the aneurysmal site [10]. With the experience of the current case, we conclude that MDS may be a favoured option in SCT patients.

Although there are no randomized trials comparing treatments of cerebral aneurysms in patients with SCD/SCT, with improved medical management of pre- and postoperative haematological status and careful anaesthetic techniques, we strongly recommend these patients be considered for endovascular coiling using MDS. However, active and complete management of the underlying sickling disorder is mandatory. A further concern is the role of this procedure in long term aneurysmal ablation.

## Ethical permission

Ethical approval was not necessary for preparation of this article.

## Patient consent

Informed consent was taken from the patient that the case would be an object of scientific observation and further publication.

## Conflict of interest

None declared.

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